REMARKS

Reconsideration and withdrawal of the rejections of the claims set forth in the Office Action of August 24, 2005 are respectfully requested in view of the following remarks.

Status of the Claims

Claims 1-20 and 30 are pending.

Claims 1-20 and 30 stand rejected under 35 U.S.C. § 102.

Defective Declaration

The Examiner has indicated that the Declaration is defective because it claims priority to provisional application 06/156,210, which was filed more than one-year prior to the instant application. Applicants' attorneys have forwarded a new Declaration to the inventors without such a priority claim and will forward the Executed Declaration to the PTO after it is received.

Information Disclosure Statement

The Examiner has indicated that certain of the references filed in Applicants' prior IDS submissions were illegible. Concurrently herewith, Applicants submit a supplementary IDS including the references the Examiner the Examiner lined-out and did not initial. Applicants respectfully request consideration by the Examiner.

Claim Rejections – 35 U.S.C. § 102(b)

The Examiner has rejected claims 1-20 and 30 under 35 U.S.C. § 102(b) as allegedly being anticipated by "A Novel 1x4 Coupler-Multiplexer Permutation Switch for WDM Applications", Journal of Lightwave Technology, Vol. 18, No. 4, April 2000 to Ramadan et al. ("the Ramadan publication"). Applicants respectfully traverse this rejection and respectfully request reconsideration and withdrawal of this rejection based on the following remarks.

Applicants submit that the Examiner has failed to meet his burden of proof to show the Ramadan publication is a patent-defeating prior art reference. Section 102(b) of the Patent Statute provides:

> A person shall be entitled to a patent unless --
>
> . . .
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States . . . .

35 U.S.C. § 102. Further, MPEP § 706.02(a) provides that "[t]he examiner must determine the issue or publication date of the reference so that a proper comparison between the application and reference dates can be made." Thus the burden of proof to defeat patentability by use of a printed publication rests with the person seeking to invalidate the patent. See In re Oetiker, 977 F.2d 1443, 1145 (Fed. Cir. 1992) (explaining that "the examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a prima facie case of unpatentability.").

Applicants submit that the Examiner has failed to prove the Ramadan publication defeats the patentability of the pending claims for at least the following reasons: 1) the Examiner has failed to show the publication date of the Ramadan publication (which simply indicates the month of "April 2000" on its face) was more than one year prior to the instant application's filing date; and 2) the Examiner has failed to prove the Ramadan reference was accessible to the public more than one year prior to the instant application's filing date.

First, the Examiner is apparently using the date of "April 2000" which is printed on the face of the Ramadan publication in his rejection of the claims of the instant application which has a filing date of April 20, 2001. This date of "April 2000" printed on the face of the Ramadan publication, since it does not show a particular day, is not sufficiently specific to defeat a

Applicants' filing date of April 20, 2001. Thus, even if the date printed on the face of the Ramadan publication indicated the time in which it was accessible to the public, the Examiner has failed to prove it was accessible on or before April 19, 2000 in order to satisfy the one-year statutory bar of § 102(b). In 2001 when preparing the instant application for filing, Applicants' attorneys contacted IEEE to inquire of the publication date of the Ramadan publication, and IEEE indicated that the Ramadan publication was first published by the IEEE on or about April 20, 2000. Applicants are aware of no evidence that suggests that the Ramadan publication was published prior to April 20. Accordingly, since the burden of proof rests with the Examiner, the rejection should be withdrawn.

Second, the Examiner has failed to prove the Ramadan publication was accessible to the public more than one-year prior to the filing date of the instant application. MPEP § 706.02(a) provides that a "magazine is effective as a printed publication under 35 U.S.C. § 102(b) as of the date it reached the addressee and not the date it was placed in the mail." MPEP § 2128.02 provides that "[a] publication disseminated by mail is not prior art until it is received by at least one member of the public. Thus a magazine or technical journal is effective as of its date of publication (date when first person receives it) not the date it was mailed or sent to the publisher." Thus, even if April 20, 2000 were the mailing date of the Ramadan publication, the date it would have been accessible to the public would necessarily be later.

In 2005 after receipt of this Office Action, Applicants' attorneys conducted an investigation to determine the shelving date on which several libraries date stamped the Ramadan publication. The Library of Congress date stamped the Ramadan publication on May 22, 2000. See Exh. A. The University of Texas as Austin date stamped the Ramadan publication on May 2, 2000. See Exh. B. The Canada Institute for Scientific and Technical

Information date stamped the Ramadan publication on May 12, 2000. See Exh. C. Applicants respectfully point out to the Examiner that in Exhs. A and C, the date stamp is indicated on the first article of Vol. 18 of the Journal of Lightwave Technology of April 2000, which is a different article than the Ramadan publication, which was also published in the same issue. Applicants direct the Examiner's attention to Exh. B, which shows the table of contents of Vol. 18, and indicates that on page 579 the Ramadan publication begins, and on page 461 the article shown in Exhs. A and C begins. Thus, Exhs. A-C indicate a date of public accessibility less than one-year prior to the filing of the instant application. Accordingly, since the burden of proof rests with the Examiner, the rejection should be withdrawn.

Conclusion

In view of the foregoing, this application is now believed to be in condition for formal allowance. Prompt and favorable action is respectfully requested. Applicants do not believe that any additional fee is required in connection with the submission of this document. However, should any additional fee be required, or if any overpayment has been made, the Commissioner is hereby authorized to charge any fees, or credit or any overpayments made, to Deposit Account 02-4377.

Respectfully submitted,
BAKER BOTTS L.L.P.

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ISSN 0733-8724

Journal of Lightwave Technology

April 2000

Volume 18

Number 4

JLTEDG

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A Novel Medium Access Control Protocol for WDM-Based LAN's and Access Networks Using a Master/Slave Scheduler

Eytan Modiano, *Senior Member, IEEE*, and Richard Barry, *Member, IEEE*

***Abstract*—We describe an architecture and medium access control (MAC) protocol for wavelength-division multiplexing (WDM) networks. Our system is based on a broadcast star architecture and uses an unslotted access protocol and a centralized scheduler to efficiently provide bandwidth-on-demand in WDM networks. To overcome the effects of propagation delays the scheduler measures the delays between the terminals and the hub and takes that delay into account when scheduling transmissions. Simple scheduling algorithms, based on a look-ahead capability, are used to overcome the effects of head-of-line blocking. An important application area for this system is in optical access networks, where this novel MAC protocol can be used to access wavelengths in a WDM passive optical network (PON).**

***Index Terms*—Medium access control protocols (MAC), optical networks, wavelength-division multiplexing (WDM).**

I. Introduction

IN RECENT years there has been a wave of research toward the development of wavelength-division multiplexing (WDM)-based local area networks (LAN's) [1]–[10]. Most of the proposed protocols and architectures are based on a broadcast star network architecture. Some of the protocols are based on random access and consequently result in low throughput due to contention [3], [4]. Other protocols attempting to minimize contention, through the use of some form of reservations, require that the system be synchronized and slotted, and many of these protocols require multiple transceivers per node [5]–[8]. Despite the added complexity of these systems, most still fail to achieve high levels of utilization due to inefficient scheduling scheme that fail to deal with receiver contention or ignore the effects of propagation delays. A comprehensive survey of WDM multiaccess protocols and their properties is presented in [1], [2].

The purpose of the system described in this paper is to achieve good throughput delay characteristics while maintaining simple user terminals. Previous efforts to simplify user terminals involved protocols [9] [10] that use fixed tuned receivers or transmitters. However, those protocols limit the number of users to the number of available wavelengths and are hence not scalable. Also, protocols using only a single fixed tuned device are often limited to the use of a random access protocol, resulting in low channel utilization [3], [5].

The architecture and protocol described in this paper eliminate the need for slotting and synchronization, yet it results in high utilization in both WDM-based LAN's and passive optical access networks. The system consists of a simple broadcast-and-select star network. Each user terminal consists of a single transmitter and receiver, both of which are tunable over all data wavelengths and one control wavelength. In addition, an optional, fixed tuned transceiver can also be used for the purpose of communicating on the control channel. The proposed system can support tens of wavelengths operating at 10 Gb/s each.

This system is particularly applicable to optical access networks. Future optical access network architectures will use a passive optical network (PON) to connect between the central office and end-users [19]. Each PON will need to support hundreds of users; hence, there will be a need for users to share wavelengths. The proposed system is ideally suited for providing bandwidth-on-demand in this environment.

The system is novel in a number of ways. First, it uses an unslotted MAC protocol yet results in high efficiency even in high latency environments. The choice of an unslotted protocol is driven by the desire to eliminate the requirement to maintain slotting in the network. Unfortunately, unslotted MAC protocols such as CSMA result in very low utilization when used in systems with high latency. Alternatively, high latency protocols such as unslotted Aloha are limited in throughput to less than 18% [3], [5]. Another novelty of our system is that it uses a centralized master/slave scheduler which is able to schedule transmissions efficiently. To overcome the effects of propagation delays the scheduler measures the delays between the terminals and the hub and takes that delay into account when scheduling transmissions.

The system uses simple scheduling algorithms that can be implemented in real-time. Unicast traffic is scheduled using first-come-first-serve input queues and a window selection policy to eliminate head-of-line blocking, while multicast traffic is scheduled using a random algorithm [12]. Analysis and simulations show that the system can achieve low delays even at high loads.

While the use of a centralized scheduler can significantly improve the performance of the system, it also increases the overall cost of the system. However, the functionality of the scheduler described in this paper is relatively simple and can be easily implemented in a single application specific integrated circuit (ASIC). The cost of such a scheduler, which is shared among all of the users in the network, is relatively minimal when compared

Manuscript received December 18, 1998; revised December 3, 1999. This work was supported by DARPA under the Next Generation Internet Initiative.

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Publisher Item Identifier S 0733-8724(00)03026-7.

FGH34213 *CI-05764666-9*

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Received:	2005/10/03 10:54:58
Printed:	2005/10/03 14:24:01

Direct	**Periodical**	**WWW Catalogue**	**UNITED STATES**

Client Number:	DSCHALK
Title:	**JOURNAL OF LIGHTWAVE TECHNOLOGY : A JOINT IEEE/OSA PUBLICATION.**
DB Ref. No.:	IRN10335316
ISSN:	ISSN07338724
Vol./Issue:	18/4/APR
Date:	2000
Pages:	TITLE PG-DATE RECD STAMP & T OF CONTENTS
Article Title:	NO ARTCLE NECESSARY -TRYING TO DETERMINE WHEN
Article Author:	YOU REC'D THIS PARTICULAR ISSUE
Report Number:	IRN10335316
Publisher:	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS,
Information Source:	INNOPAC

INSTRUCTIONS: FAX

Estimated cost for this 2 page document: $12 document supply fee + $20 copyright = $32

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National Research Council Canada / Conseil national de recherches Canada

ISSN 0733-8724

ırnal of

Lightwave Technology

April 2000

Volume 18

Number 4

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Publisher Item Identifier S 0733-8724(00)03026-7.